

## USPTO Artificial Intelligence (AI) Comments – January 2020

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**Summary:** This document presents comments addressing the U.S. patent law's governance and treatment of AI. Six main patent law issues affected by AI that merit further consideration and discussion by regulators are explored, which include: (1) The AI Effect & Defining AI; (2) The Patent Subject-Matter Eligibility Standard for AI; (3) Patentability and Inventorship Issues for AI-Generated Inventions; (4) Liability Issues for Patent Infringement by AI; (5) Nonobviousness Standard for AI; and (6) Interaction of AI and Other Technologies: Impact on IP. Regulatory approaches to these issues must be comprehensive and multifaceted, so an optimal balance can be struck between the various competing factors. Regulators can utilize current marketplace offerings and strategies across industries as guidelines in analyzing the applicability of current regulations and/or adopting new regulations.

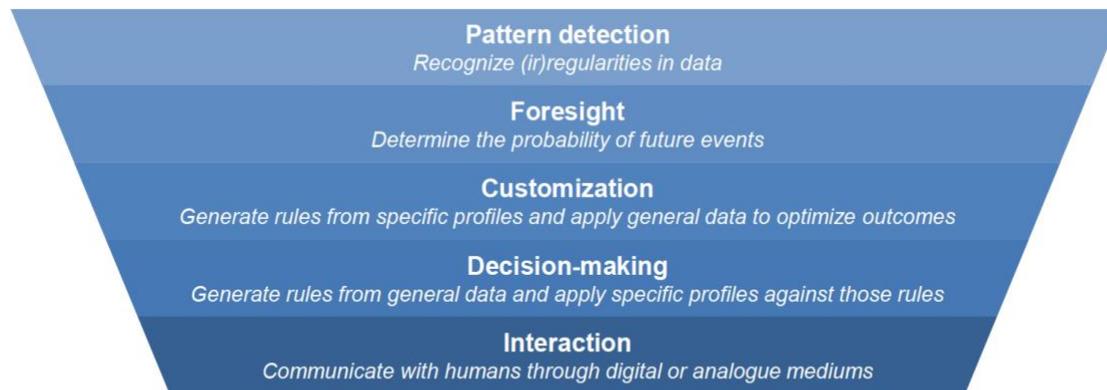
Sources: World Economic Forum

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# 1. The AI Effect & Defining AI

There is a marked lack of clarity around the definition of AI, which frequently leads to confusion and outright disagreement. Conversations with global experts and business leaders reveal a lack of common definitions for AI. This lack of definitional clarity is illustrative of a well-documented phenomenon called the AI effect. Essentially, this means the inability of observers to agree on what is, and isn't, intelligence and a tendency to conclude that the existing capabilities of computer programs are not "real" intelligence. For intellectual property regulations to be effective under the USPTO, AI must be clearly defined within the regulatory framework.

When industry professionals talk about AI, they typically are not talking about a particular technical approach or a well-defined school of computer science, rather they are talking about a set of capabilities that allows organizations to run their operations in a new way. At their core, these capabilities are almost always **a suite of technologies, enabled by adaptive predictive power and exhibiting some degree of autonomous learning, that have made dramatic advances in our ability to use machines to automate and enhance the following:**



Many applications of AI-driven technology use a combination of the above automations and enhancements

## 2. The Patent Subject-Matter Eligibility Standard for AI

The present standard on patent-eligible subject matter needs to be carefully evaluated to determine whether it has any material negative impact on AI or AI-driven technologies. If so, regulators must search for possible adjustments to the standard that can better achieve the patent law's main objectives, such as promoting innovation, disseminating useful information, and incentivizing investment in helpful technologies. The anticipated benefits from the contemplated changes must then be weighed against the negative social and ethical implications that may arise from those changes. Regulators should also consider other available mechanisms for promoting and protecting AI innovation (e.g. laws on trade secrets or copyrights) to help assess whether any of the identified shortfalls in the patent law's subject-matter eligibility standard can be rectified through other means.

Discussions need to address whether the present subject-matter patentability standard promotes the main objectives of U.S. patent law. For example, whether the present standard promotes or stifles innovative technologies relating to AI is an important question. Many have argued that patents provide incentives for innovation, investment and invention, and that awarding patent rights to software can encourage investment in software-related research and further promote innovation. This argument would apply analogously to AI, but the case for innovation may be stronger, given the greater potential of AI than general software. Others have argued that patents on software stifle innovation. Some have suggested that patents should not be awarded to any software, whereas others have proposed awarding shorter patent terms to software patents. Also note, courts often hold that patent claims mimicking or replicating human activity lack any "inventive concept." These differing perspectives must be sufficiently considered to determine whether AI patents in fact promote innovation, or whether those technologies are better protected through other means (e.g. laws on trade secrets or copyrights). Similar conversations are needed for the other objectives of patent law. For example, regulators should assess whether the present standard promotes the disclosure and dissemination of useful information and whether it incentivizes people to create new inventions.

The discussions should also account for AI-specific factors as opposed to broader software-specific considerations when assessing whether incentivizing AI through patent rights may have different or greater economic, social, and ethical impact than incentivizing general software. For example, many have expressed concern that AI could make much of human employment redundant, having more profound negative economic effects than prior technological changes. Others believe that AI's overall economic impact will not be very different from those of previous technological advances. But even if that were true, some still find it troublesome because they believe that recent technological changes have contributed to increasing inequality and falling labor force participation. Still others advocate that AI should be further promoted to facilitate making groundbreaking discoveries, which will raise productivity growth and improve the lives of people worldwide, thereby

overcoming any negative impact of AI on employment and inequality. Also, if the legal standard is lowered, would companies that are leading filers of AI patents gain unfair advantages? Given that AI may be able to generate further inventive ideas on its own (which general software is unable to do), the first-mover advantage for those owners of AI patents may be much greater than that of general software patents. Some believe that this will result in those first-movers having “too much power, if we don’t begin to update patent law now.” This may exacerbate the existing risks of AI-induced wage gaps and economic inequality.

How to implement legal changes to maximize the social and ethical benefits from AI should also be explored, to the extent that any patent law adjustments are deemed necessary. Lowering the subject-matter patentability standard for AI inventions relating to areas deemed more socially beneficial, such as healthcare, the environment, criminal justice, and education, might be one way to help balance promoting innovation with mitigating ethical concerns. These issues must be carefully examined by regulators to ensure U.S. patent law evolves to strike an optimal balance between the various competing objectives.

### 3. Patentability and Inventorship Issues for AI-Generated Inventions

The question of whether inventions that are created entirely by AI should be protected with patents needs to be answered. To help arrive at an effective solution, regulators must diligently analyze the potential positive and negative effects – from technological, socio-economic, and ethical viewpoints – in patenting AI-generated inventions, and then assess these effects in view of one another. Possible middle grounds between the competing interests must be identified to help the U.S. patent system achieve its main objectives in a well-balanced manner. If regulators ultimately decide to allow AI-created inventions to be patentable, then they must also decide whether inventorship should be awarded to AIs that generated those inventive ideas.

#### **Patent-eligibility**

The patent-eligibility issue for AI-generated inventions must be explored in the context of whether patents on AI-generated inventions would further the U.S. patent law system’s main objectives. Some have argued that granting patent rights to AI-generated inventions would accelerate innovation, even enabling advances that would not have been possible through human ingenuity alone. Others have argued that patent rights do not promote innovation, irrespective of whether inventions are generated by people or AI. Under this view, more patents, resulting from AI-generated inventions, will increase social costs and monopolies, and stifle the entry of new ventures, thereby hampering innovation. China’s New Generation Artificial Intelligence Development Plan includes language that calls for promoting “the innovation of AI intellectual property rights,” which some could interpret as encouraging recognition of IP rights for AI-generated works (although no mention is made of promoting AI as inventors).

Some point out that, even if patents on AI-generated inventions ultimately promote innovation, those patents may “negatively impact future human innovation as supplanting human invention with autonomous algorithms could result in the atrophy of human intelligence.” The concern is that reduced inventive talent could lead to the elimination of high-quality research and development (R&D) jobs or entire R&D-intensive industries. Others even argue that the notion of awarding patent protection on AI-generated inventions should be abolished altogether. In their view, alternative tools, such as first-mover advantage and social recognition of AIs, as well as alternative technologies that prevent infringement of patent rights, can better lead to innovations and public disclosure of inventions. These competing views must be carefully considered to determine the overall net impact on innovation from granting patent rights to AI-generated inventions. Each of the U.S. patent law system’s other main objectives requires attention, such as assessing whether patents on AI-generated inventions would promote the dissemination of information or incentivize the right “beings” to create inventions that will help the system remain effective.

Further discussions must identify possible “middle grounds” to help balance the competing objectives and factors. For example, one could consider raising the patentability standard (e.g. on nonobviousness) for inventions created solely by AI, which would level the playing field to some extent between human inventors and AI. In this way, a middle ground may be provided between promoting innovation and continuing to incentivize people to invent. A similar balance may be achieved by granting different patent periods based on the level of human involvement in the inventive process. In these scenarios, discussions must also address mechanisms to ensure that patent applicants are not being untruthful about AI’s involvement in the inventive process to circumvent the law.

Balancing the U.S. patent law’s objectives to promote social, economic, and ethical responsibility is another area for discussion. One possibility for promoting innovation in an ethically sound way could be to raise the utility requirement for AI inventions under 35 U.S.C. § 101, which requires that the invention be useful to be patentable. Although the bar for utility is set relatively low today, the doctrine of moral utility was often invoked in the late 19<sup>th</sup> century to deny patents on gambling devices. Analogously, there may be grounds for raising the bar for utility just for AI-generated inventions, so that only the truly “useful” inventions by AI would be eligible for patent rights. Another possibility is to protect only certain types of AI-generated inventions deemed as having greater social benefits, such as those relating to healthcare, the environment, criminal justice, and education. Or perhaps the obviousness standard could be raised for just the AI-generated inventions not directed to one of those with “greater social benefits.”

The possible solutions cannot lose sight of the human responsibility for AI, because completely undirected, unsupervised innovations by AIs without human oversight can have negative, unintended consequences. Discussions must sufficiently address how such human responsibility can be provided and seek ways to promote transparency and accountability in AI.

### **Inventorship**

If inventions generated entirely by AI become eligible for patent rights, the next question to address is who should be listed as the inventor. The current law requires conception or “the formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention” for there to be an invention. Thus, if all the conception takes place in the “mind” of an AI technology, then there would be no person to list as the inventor under the present law. This presents two main options: (1) list AI as the inventor; or (2) list no inventors on the face of the patent.

Some argue that if AI’s work “is indeed inventive, then both treating computational inventions as patentable and recognizing [AI] as an inventor would be consistent with the constitutional rationale for patent protection.” But to do so would require the recognition of AI as a legal entity or a legal person, which is not available under current U.S. law. Nevertheless, the general definition of a “legal person,” which is “a subject of legal rights and obligations,” is likely broad enough to encompass AI as

long as AI's role as an inventor is subject to legal rights and obligations. Legal personhood and inventorship status are thus theoretically possible for AI if the legislature is willing to grant them. But it is important to assess whether granting inventorship would provide any benefits for the U.S. patent system. For example, except for AGI (artificial general intelligence) or super-intelligent AI that has true consciousness (which does not exist today), AI "would not be motivated by the prospect of a patent" and can continue to generate inventive ideas without any incentivizing through inventorship (like the Invention Machine and Creativity Machine). Would there be any meaningful benefits in recognizing AI as inventors beyond those provided by allowing AI-created inventions to be patentable?

This leads to the second option of not listing any inventor. Although an inventor must be listed under the current law, the U.S. patent system can be adapted to award patents to AI's inventions without listing one. In this scenario, however, sufficient incentives must be provided to the people involved in creating and maintaining the AI that generates inventive ideas, so that they will be motivated to continue developing such inventive AI. Given that the AI's owner will likely be listed as the resulting patent's assignee, the current U.S. patent system probably addresses the owner's interests adequately without additional recognition as an "inventor." But the interests of AI's developers (e.g. individual engineers), who are not given any credit on the face of the patent, may not be addressed sufficiently. If this inadequacy grows and obstructs innovation, a new category may need to be created for developers so that their contributions are acknowledged on the face of the patent.

Whether the decision ultimately comes down to listing AI as the inventor or not listing any inventor, the discussions must sufficiently consider the decision's likely effects on innovation and its economic and ethical repercussions.

## 4. Liability Issues for Patent Infringement by AI

The present liability laws do not account for situations where patent infringement is committed independently by an AI. Regulators need to explore “who” should be held liable in those situations and how remuneration should be assessed. The different existing liability frameworks must be analyzed to identify their relative strengths, and new approaches should be researched to see if they can function more effectively than the existing liability systems.

The view that patent infringement by humans or AI should be deterred is likely not controversial. Moreover, failing to hold “someone” liable for patent infringement by AI will likely encourage using AI for infringement. But more discussions on how to handle patent infringements by AI are required, such as on who should be held liable and on how liability should be assessed. The answers must promote the U.S. patent law system’s main objectives, as well as maximize the social, economic, and ethical benefits.

The European Parliament Resolution “at least at the present stage” advocates holding a person responsible rather than an AI. As to which human actor to hold liable, one possibility would be the AI’s end users; as noted in the Resolution, the “rules governing liability for harmful actions – where the user of a product is liable for a behavior that leads to harm” could apply to damages caused by AI. This can create uncertainty among software users, however, and may lead to their disuse of otherwise helpful AI. It would also be unfair in many instances, given that end users often cannot foresee the patent infringement, especially if they are individuals and not sophisticated corporations. Patent owners sue the companies that develop and/or sell the products much more frequently than the end users of those products, and even in those cases where the end users are sued and held liable, they are often indemnified by the products’ manufacturers.

This leads to the other option of holding the developer or manufacturer of AI accountable. Holding a product’s manufacturer liable for patent infringement is common practice in patent litigation. This may be suitable in the AI context as well because the developers ultimately create the AI (that infringes the patent), are usually in a relatively better position to foresee the infringement than the end users, and have likely derived economic value from the AI (e.g. selling AI to the end users). The manufacturer may also be held liable in the context of product liability, “where the producer of a product is liable for a malfunction,” as provided in the resolution. In this case, AI’s infringing act would have to be analogized to the product “malfunction.”

Even so, with truly autonomous AI, can a human agent really anticipate against or properly oversee the AI to avoid infringement? Would holding people liable for unforeseeable acts deter AI’s development and use because of people’s fears of being held liable for unexpected patent infringement, and therefore hinder innovation? Thus, for truly autonomous AI, the

traditional rules may “not suffice to give rise to legal liability for damage caused by a robot, since they would not make it possible to identify the party responsible for providing compensation and to require that party to make good the damage it has caused.”

So, how should liability for patent infringement by truly autonomous AI be handled? One possibility, as suggested in the European Parliament Resolution, “could be an obligatory insurance scheme, as is already the case, for instance, with cars,” although the insurance system for AI would have to account for all potential responsibilities in the chain (instead of just people’s actions, as in car insurance systems). The resolution also raises the possibility of supplementing such an obligatory insurance system with a fund to ensure that reparation can be made for damages where no insurance coverage exists.

Another option would be to hold the AI itself liable, which would require recognizing AI as a legal person (or legal entity). As discussed, the definition of a legal person is likely broad enough to include AI. In addition, there may be greater incentives in granting legal personality to AI in the context of determining liability than in the context of awarding inventorship. The European Parliament Resolution recognizes this possible need for AI personhood in considering liability for damages caused by AI: “creating a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently.”

Once the entity responsible for patent infringement caused by AI is determined, careful deliberation is needed on how liability should be assessed. The European Parliament Resolution asserts that, regardless of the legal solution selected for addressing liability, the future legislative instrument should in no way restrict the type or extent of damages that may be recovered or limit the forms of compensation that may be offered to the aggrieved party, on the sole basis that the damage was caused by a non-human agent. If a human agent is to be held responsible, the resolution advises that “their liability should be proportional to the actual level of instructions given to the [AI] and of its degree of autonomy, so that the greater a[n AI’s] learning capability or autonomy, and the longer a[n AI’s] training, the greater the responsibility of its trainer should be.” The Resolution also mentions potentially applying strict liability or the risk management approach, subject to an in-depth evaluation, although some argue that strict liability against the human developer would be misguided. And if AI itself were to be held liable after being given special legal status, the liability of AI may be treated analogously to how the liability of corporations is assessed for patent infringement.

Some are even entirely against the current liability system; they argue that a contractual solution is required instead because it provides parties with a predictable solution to liability. Under this view, parties using an AI should employ contractual terms

(e.g. indemnification clauses) to best avoid liability for direct infringement by AI. These options and considerations must be assessed by weighing their social, economic, and ethical implications, while striving to ensure efficient, transparent, and consistent implementation of legal certainty for citizens, consumers, and businesses alike.

## 5. Nonobviousness Standard for AI

Further discussions are necessary on whether changes need to be made to the present definition of a “person of ordinary skill in the art” (POSITA), which is a hypothetical person through which obviousness of an invention is evaluated. As the use of AI becomes more prevalent, the actual people “of ordinary skill” that work in various industries will increasingly rely on AI. Thus, a categorical exclusion of AI’s involvement from the definition of a POSITA can risk having a nonobviousness standard that fails to accurately reflect the real-world level of obviousness. But on the flip side, as AI becomes “smarter,” incorporating the use of AI into the definition of a POSITA would likely result in more inventions being deemed obvious and, ultimately, in a smaller number of patents being granted. In this scenario, if AI reaches superintelligence one day, would that not mean that everything will be considered obvious? These questions must be studied to help arrive at a nonobviousness standard under U.S. patent law that is accurate.

As AI becomes ubiquitous, or at least more prevalent in various industries, discussion is required on whether the present definition of a POSITA is adequate – requiring a person and not an automaton – or whether it should be adjusted so that it can also mean a person equipped with AI if the use of AI is common practice in that technology space. Revising the definition to encompass a person’s use of AI would substantially raise the bar for nonobviousness. Setting the standard too high could prevent deserving inventions from being patented and could thus hamper innovation. On the other hand, a hurdle that is set too low can result in a flood of junk patents and in more patent cases being filed (especially by “patent trolls”) against true innovators, which can impede businesses and economic growth. Some proponents for changing the POSITA definition (so that it refers to a person using AI, or even just the AI itself) argue that, as “inventive” machines continue to improve and increasingly raise the bar of patentability, only the most innovative technologies will become patented. But this can also result in less patents being granted on human-generated inventions, which can pose several risks, as discussed. Moreover, if AI becomes truly super-intelligent, then AI as a POSITA could also mean that all innovative activities will eventually be deemed obvious (in the “eyes” of the super-intelligent AI). Some even argue that traditional patent law is irrelevant, and that other, non-patent incentives should be used to provide the gatekeeping function of nonobviousness. Further discussions on these issues should identify the benefits and risks of changing the POSITA definition to allow AI participation with these differing views in mind.

## 6. Interaction of AI and Other Technologies: Impact on IP

It is also important to understand that AI does not exist in a vacuum. Its capabilities will be intertwined with the development of all other technological innovations. Emerging technologies are mutually reinforcing, and the abilities of any one new technology are influenced by its interactions with other technologies. The potential list of interactions is endless and will continue to develop and grow as these technologies mature and new disruptive technologies come to fruition. Regulators should begin to consider the impact on IP and the U.S. patent law system resulting from the interaction of AI and other technologies (such as cloud computing, blockchain, Internet of Things (IoT), and quantum computing).

Several examples of mutually reinforcing interactions

